

## Glossary

**absolute humidity (also called vapor concentration and vapor density)** - in a system of moist air, the ratio of the mass of water vapor present to the volume occupied by the mixture, that is, the density of the water vapor component. It is not commonly used by meteorologists. See relative humidity.

**absorption** - the process of an agent being taken into the vegetation, skin, materiel, or soil. Important for only a few agents.

**active front** - the boundary between two different air masses, or a portion thereof, which produces appreciable cloudiness and precipitation and is usually accompanied by significant shifts in wind direction.

**adiabatic lapse rate** - the rate of decrease of temperature with height of a parcel of dry air lifted upward through the atmosphere with no addition or deletion of heat.

**adiabatic process** - a thermodynamic change of state of a system in which there is no transfer of heat or mass across the boundaries of the system. In an adiabatic process, compression always results in warming, expansion in cooling. In meteorology the adiabatic process often is also taken to be a reversible process. For many purposes, changes of state in the free atmosphere over periods of two days or less are assumed to be adiabatic.

**adsorption** - adding a thin layer to vegetation (usually aerosol). Important in dense vegetation.

**advection fog** - a type of fog caused by the passage of moist air horizontally over a relatively colder surface and the consequent cooling of that air to below its dew point.

**adverse weather** - weather in which military operations are generally restricted or impeded.

**aerology** - the study of the air and of the atmosphere. Used in the US Navy until early 1957. The same as meteorology; however, this usage tended to be more administrative than scientific.

**aerosol** - a colloidal system in which the dispersed phase is composed of either solid or

liquid particles and in which the dispersal medium is some gas, usually air. There is no clear-cut upper limit to the size of the particles comprising the dispersed phase in an aerosol, but as in all other colloidal systems, it is rather commonly set at 1 micron. Haze, most smokes, and some fogs may thus be considered aerosols.

**air** - the mixture of gases comprising the earth's atmosphere. Since the composition of the atmosphere is slightly variable with respect to certain components, the term "pure air" has no precise meaning, but is commonly used to imply freedom from nongaseous suspensoids (dust, hydrometeors) and also freedom from such gaseous contaminants as industrial effluents.

**air drainage** - general term for gravity-induced, downslope flow of relatively cold air. Winds thus produced are called gravity winds.

**air mass** - a widespread body of air, the properties of which can be identified as (a) having been established while that air was situated over a particular region of the earth's surface (air-mass source region) and (b) undergoing specific modifications while in transit away from the source region. An air mass is often defined as a widespread body of air that is approximately homogeneous in its horizontal extent, particularly with reference to temperature and moisture distribution; in addition, the vertical temperature and moisture variations are approximately the same over its horizontal extent.

**air mass classification** - a system used to identify and to characterize the different air masses according to a basic scheme. A number of systems have been proposed, but the Bergeron classification has been the most widely accepted. In this system, air masses are designated first according to the thermal properties of their source regions: tropical (T); polar (P); and less frequently, arctic or antarctic (A). For characterizing the moisture distribution, air masses are distinguished as to continental (c) and maritime (m) source regions. Further classification according to whether the

air is cold (k) or warm (w) relative to the surface over which it is moving indicates the low-level stability conditions of the air, the type of modification from below, and is also related to the weather occurring within the air mass. This outline of classification yields the following identifiers for air masses:

<b>cTk</b>	<b>continental-tropical-cold</b>
<b>cTw</b>	<b>continental-tropical-warm</b>
<b>mTk</b>	<b>maritime-tropical-cold</b>
<b>mTw</b>	<b>maritime-tropical-warm</b>
<b>cPk</b>	<b>continental-polar-cold</b>
<b>cPw</b>	<b>continental-polar-warm</b>
<b>cAk</b>	<b>continental-arctic-cold</b>
<b>cAw</b>	<b>continental-arctic-warm</b>
<b>mAw</b>	<b>maritime-arctic-warm</b>
<b>mPk</b>	<b>maritime-polar-cold</b>
<b>mPw</b>	<b>maritime-polar-warm</b>
<b>mAk</b>	<b>maritime-arctic-cold</b>

**air mass source region** - an extensive area of the earth's surface over which bodies of air frequently remain for a sufficient time to acquire characteristic temperature and moisture properties imparted by that surface. Air so modified becomes identifiable as a distinct air mass. See air mass.

**air parcel** - an imaginary body of air to which may be assigned any or all of the basic dynamic and thermodynamic properties of atmospheric air. A parcel is large enough to contain a very great number of molecules, but small enough so that the properties assigned to it are approximately uniform within it and so that its motions with respect to the surrounding atmosphere do not induce marked compensatory movements. It cannot be given precise numerical definition, but a cubic foot of air might fit well into most contexts where air parcels are discussed, particularly those related to static stability.

**albedo** - the fraction of light or the amount of electromagnetic radiation reflected by a body to the amount incident upon it, commonly expressed as a percentage. The albedo is distinguished from the reflectivity, which refers to one specific wavelength (monochromatic radiation). (As the moon, a planet, a cloud, the ground, or a field of snow reflects light.)

**altocumulus (abbreviated Ac)** - a principal medium-level cloud type, white and/or gray in color, which occurs as a layer or patch with a

waved aspect, the elements of which appear as laminae, rounded masses, or rolls. These elements usually are sharply outlined, but they may become partly fibrous or diffuse; they may or may not be merged; they generally have shadowed parts; and, by convection, when observed at an angle of more than 30° above the horizon, subtend an angle between 1° and 5°.

**altostratus (abbreviated As)** - a principal medium-level cloud type in the form of a gray or bluish (never white) sheet or layer of striated, fibrous, or uniform appearance. Altostratus very often totally covers the sky, and may, in fact, cover an area of several thousand square miles. The layer has parts thin enough to reveal the position of the sun; and if gaps and rifts appear, they are irregularly shaped and spaced.

**anabatic wind** - an upslope wind; usually applied only when the wind is blowing up a hill or mountain as a result of local surface heating and apart from the effects of the larger scale circulation; the opposite of katabatic wind. The most common type anabatic is the valley wind.

**APC** - armored personnel carrier.

**arctic front** - the semipermanent, semicontinuous front between the deep, cold arctic air and the shallower, basically less cold polar air of northern latitudes; generally comparable to the antarctic front of the southern hemisphere.

**arty met** - artillery meteorological.

**ATGM** - antitank guided missile.

**AWS** - Air Weather Service.

**bora** - a cold, often dry, northeasterly wind which blows, sometimes in violent gusts, down from mountains on the eastern shore of the Adriatic. It also applies to cold, squally, downslope winds in other parts of the world.

**CARC** - chemical agent resistant coating.

**CDM** - chemical downwind message.

**Celsius (abbreviated C)** - (formerly referred to as centigrade) thermometric scale with 100 degrees between freezing and boiling, 0°C for freezing and 100°C for boiling.

**centigrade** - see Celsius.

**chinook** - the name given to the descending, warm, dry wind on the eastern side of the Rocky Mountains. The chinook generally blows from the southwest, but its direction may be modified by topography. When it sets in after a spell of intense cold, the temperature may rise by 20°F to 40°F in 15 minutes due to replacement of a

cold air mass with a much warmer air mass in minutes.

**cirrocumulus (abbreviated Cc)** - a principal high-level cloud type appearing as a thin, white patch of cloud without shadows, composed of very small droplets in the form of grains or ripples. The elements may be merged or separate, and more or less regularly arranged; they subtend an angle of less than 10° when observed at an angle of more than 30° above the horizon. Holes or rifts often occur in a sheet of cirrocumulus.

**cirrostratus (abbreviated Cs)** - a principal high-level cloud type appearing as a whitish veil, usually fibrous but sometimes smooth, which may totally cover the sky and which often produces halo phenomena, either partially or completely. Sometimes a banded aspect may appear, but the intervals between the bands are filled with thinner cloud veil. The edge of the veil of cirrostratus may be straight and clean-cut, but more often it is irregular and fringed with cirrus. Some of the ice crystals that comprise the cloud are large enough to fall and thereby produce a fibrous aspect. Cirrostratus occasionally may be so thin and transparent as to render it almost indiscernible, especially through haze or at night. At such times, the existence of a halo may be the only revealing feature, such as producing a halo around the moon.

**cirrus (abbreviated Ci)** - a principal high-level cloud type composed of detached cirriform elements in the form of white, delicate filaments, of white (or mostly white) patches, or of narrow bands. These clouds have a fibrous aspect and/or a silky sheen. Many of the ice crystal particles of cirrus are sufficiently large to acquire an appreciable speed of fall; therefore, the cloud elements have a considerable vertical extent. Wind shear and variations in particle size usually cause these fibrous trails to be slanted or irregularly curved. For this reason, cirrus does not usually tend, as do other clouds, to appear horizontal when near the horizon. Because cirrus elements are too narrow, they do not produce a complete circular halo.

**climate** - the long-term manifestations of weather. The climate of a specified area is represented by the statistical summary of its weather conditions during a period long enough

to ensure that representative values are obtained (generally 30 years).

**climatic study** - analysis and interpretation of climatic summary data in light of probable impacts on operations, plans, construction, and the like.

**climatic summary** - tabular data for averages, extremes, and frequencies of weather elements or phenomena for a year, season, month, or other period at a specific location or area.

**climatology** - the science that deals with climates and investigates their phenomena and causes.

**cloud** - a collection of very small water droplets or ice crystals or both, with its base above the earth's surface.

**colloidal system (also called colloidal dispersion, colloidal suspension)** - an intimate mixture of two substances one of which, called the dispersed phase (or colloid), is uniformly distributed in a finely divided state throughout the second substance, called the dispersion medium (or dispersing medium). The dispersion medium may be a gas, a liquid, or a solid, and the dispersed phase may also be any of these, with the exception that one does not speak of a colloidal system of one gas in another. A system of liquid or solid particles colloiddally dispersed in a gas is called an aerosol. A system of solid substances or water-insoluble liquids colloiddally dispersed in liquid water is called a hydrosol.

**coniferous forests** - concentrations of evergreen trees normally found on slopes and mountains; for chemical behavior purposes, the same as medium-dense deciduous forests or woods (when in full foliage only).

**CONUS** - continental United States.

**convection** - in general, mass motions within a fluid resulting in transport and mixing of the properties of that fluid. Convection, along with conduction and radiation, is a principal means of energy transfer. Distinction is made between free convection (or gravitational convection)—motion caused only by density differences with the fluid—and forced convection—motion induced by mechanical forces such as deflection by a large-scale surface irregularity, turbulent flow caused by friction at the boundary of a fluid, or motion caused by any applied external force.

**coriolis force** - a force exerted on a parcel of air (or any moving body) due to the rotation of the earth. This force causes a deflection of the body to the right in the northern hemisphere and to the left in the southern hemisphere.

**cumulonimbus (abbreviated Cb)** - a principal cloud type, exceptionally dense and vertically developed, occurring either as isolated clouds or as a line or wall of clouds with separated upper portions. These clouds appear as mountains or huge towers, at least a part of the upper portions of which are usually smooth, fibrous, or striated, and almost flattened. This part often spreads out in an anvil shape (incus) or vast plume. Under the base of a cumulonimbus, which often is very dark, there frequently exists virga, precipitation, and low, ragged clouds, either merged with it or not. Its precipitation is often heavy and always of a showery nature. The usual occurrence of lightning and thunder within or from this cloud leads to its common names, thundercloud, thunderhead (usually refers only to the upper portion of the cloud), and thunderstorm.

**cumulus (abbreviated Cu)** - a principal cloud type in the form of individual, detached elements which are generally dense, low-level with vertical development and possess sharp nonfibrous outlines. These elements develop vertically, appearing as rising mounds, domes, or towers, the upper parts of which often resemble a cauliflower. The sunlit parts of these clouds are mostly brilliant white; their bases are relatively dark and nearly horizontal. Near the horizon, the vertical development of cumulus often causes the individual clouds to appear to be merged. If precipitation occurs, it is usually of a showery nature.

**current weather report** - information on existing weather conditions or specific weather element; may be oral, written, or graphic representations.

**cyclone** - a system of winds rotating around a center of low atmospheric pressure. A cyclone rotates counterclockwise in the northern hemisphere and clockwise in the southern hemisphere (opposite to that of an anticyclone). Modern meteorology restricts the use of the term cyclone to the cyclonic-scale circulations. But, it is still applied popularly to the more or less violent, small-scale circulations such as

tornadoes, waterspouts, and dust devils (which may in fact exhibit anticyclonic rotation), and even, very loosely, to any strong wind. Because cyclonic circulation and relative low atmospheric pressure usually coexist (in the northern hemisphere), in common practice the terms cyclone and low are used interchangeably. Also, because cyclones nearly always are accompanied by inclement (sometimes destructive) weather, they are frequently referred to simply as storms.

**deciduous forests** - concentrations of seasonal, leafy trees; for chemical behavior calculations, the same as coniferous forests or woods when in full foliage only.

**deliberate smoke** - smoke operations which are planned with much detail for implementation over large areas or relatively long time periods.

**dew** - water condensed onto grass and other objects near the ground. Dew forms when temperatures fall below the dew point of the surface air due to radiational cooling during the night but are still above freezing. Hoarfrost (or white frost) forms if the dew point is below freezing. If the temperature falls below freezing after the dew has formed, the frozen dew is known as white dew or jackfrost.

**dew point (or dew point temperature)** - temperature to which a given parcel of air must be cooled at constant pressure and constant water vapor content for saturation to occur. When this temperature is reached, water is condensed onto grass and other objects contacting the cooled air. When the dew point is below 32°F (0°C), it is sometimes called the frost point. The dew point may be defined as the temperature at which the saturation vapor pressure of the parcel is equal to the actual vapor pressure of the contained water vapor.

**diffusion** - exchange of airborne media between regions in space in an apparently random motion of a small scale.

**diurnal** - repeated or recurring daily. Having a daily cycle of completed actions in 24 hours and recurring every 24 hours. Thus, most reference is made to diurnal tasks, cycles, tides, or sunrise to sunset.

**dose** - amount of agent taken into or absorbed by the body.

**dose rate** - how fast a dose is absorbed or taken into the body.

**drizzle** - very small, numerous, and uniformly dispersed water drops, mist, or sprinkle. Unlike fog droplets, drizzle falls to the ground. It is sometimes accompanied by low visibility and fog.

**dry-bulb humidity** - dryness of the free air as measured by use of two thermometers. One is dry-bulb and the other is wet-bulb. The difference between the two readings is the humidity for surrounding air. (See hygrometer, psychrometer.)

**dry-bulb temperature** - temperature of the free air as measured with a dry thermometer on a sling psychrometer over a grassy surface at a height of approximately 6 feet (1.8 meters).

**easterlies** - any persistent wind from the east (usually applied to broad currents or belts of easterly winds). The easterly belts are referred to as the equatorial easterlies, the tropical easterlies, and the polar easterlies.

**electromagnetic spectrum** - the entire range of wavelengths of all known electromagnetic radiations extending from gamma rays through visible light, infrared, and radio waves. It is divided into 26 alphabetically designated bands.

**fire storm** - an atmospheric wind system caused by a large fire (as after the bombing of a city). The intense burning creates vertical wind currents, which induces a strong wind to bring in more air to feed the fire. Incoming wind speed can exceed 60 knots in extreme cases.

**foehn** - name for a warm dry wind blowing down the side of a mountain in northern and central Europe; (same as chinook-type warm dry wind that descends eastern slopes of Rocky Mountains).

**fog oil** - petroleum based oil specially blended to produce a dense, efficient screening smoke when vaporized and recondensed at atmospheric temperatures. Officially, fog oil is standard grade fuel number 2 (SGF2).

**front** - in meteorology, generally, the interface or boundary between two air masses of different density. Since the temperature distribution is the most important regulator of atmospheric density, this front almost invariably separates air masses of different temperatures. Fronts receive their names from the movement of the air masses involved. A cold front is the leading edge of an advancing mass of cold air. A warm

front is the trailing edge of a retreating mass of cold air. When an air mass boundary is neither advancing nor retreating along the surface, the front is called a stationary front. An occluded front occurs when a cold front overtakes a warm front at the surface and a temperature contrast exists between the advancing and retreating cold air masses.

**frost** - a cover of minute ice crystals on objects that are exposed to the air. Some of these are tree branches, plant stems, leaves, wires, poles, vehicles, rooftops, or aircraft skin. Frost is the same process by which dew is formed except that the temperature of the frosted object is below freezing. Frost can be light or heavy.

**FWS** - Fleet Weather Service.

**geostrophic** - relates to or arises from the deflective force exerted on the atmosphere due to the rotation of the earth.

**geostrophic wind** - a wind whose direction and speed are determined by a balance of the horizontal pressure gradient force and the force due to the earth's rotation to the left in the northern hemisphere and to the right in the southern hemisphere.

**geostrophic wind level (also called gradient wind level)** - the lowest level at which the wind becomes geostrophic. In practice, the geostrophic wind level is between 1.2 kilometers (3,928 feet) and 1.6 kilometers (5,238 feet). This wind level probably marks the upper limit of frictional influence of the earth's surface. The geostrophic wind level may be considered to be the top of the planetary boundary layer, that is, the base of the free atmosphere.

**glaze** - a smooth coating of ice formed on objects due to the freezing of rain.

**gradient wind** - any horizontal wind velocity tangent to the contour line of a constant pressure surface (or to the isobar of a geopotential surface) at or above 2,500 feet (762 meters).

**gravity wind** - see air drainage and katabatic wind.

**greenhouse effect** - the heating effect exerted by the atmosphere upon the earth because the atmosphere (mainly, its water vapor) absorbs and reemits infrared radiation. In detail, the shorter wavelengths of solar radiation are transmitted rather freely through the atmosphere to be absorbed at the earth's

surface. The earth then reemits this as long-wave (infrared) terrestrial radiation, a portion of which is absorbed by the atmosphere and again emitted. Some of this is emitted downward back to the earth's surface (counterradiation). It is essential, in understanding the concept of the greenhouse effect, to note that the important additional warming is due to the counterradiation from the atmosphere. The glass panes of a greenhouse function the same way as the atmosphere does to maintain high greenhouse temperatures and hence the name.

**hasty smoke** - smoke operations conducted with a minimum of prior planning usually to counter enemy action or anticipated action of immediate concern to a commander.

**HC** - hexachloroethane.

**head wind** - in this manual, wind blowing away from the objective and directly toward your site.

**heavily wooded** - for chemical behavior purposes, jungles or forests with canopies that shade more than 90 percent of the ground surface beneath.

**hoarfrost (commonly called frost, white frost, crystalline frost, or hoar)** - a deposit of interlocking ice crystals formed by direct sublimation on objects, usually those of small diameter freely exposed to the air, such as tree branches, plant stems and leaf edges, wires, and poles. Also, frost may form on the skin of an aircraft when a cold aircraft flies into warm and moist air or when it passes through air that is supersaturated with water vapor. Hoarfrost is formed similarly to the way dew is formed except that the temperature of the frosted object must be below freezing. Frost forms when air with a dew point below freezing is brought to saturation by cooling. In addition to its formation on freely exposed objects (air hoar), hoarfrost also forms inside unheated buildings and vehicles, in caves, in crevasses (crevasse hoar), on snow surfaces (surface hoar), and in air spaces within snow, especially below a snow crust (depth hoar). Hoarfrost is more fluffy and feathery than rime, which in turn is lighter than glaze. Hoarfrost is designated light or heavy (frost) depending upon the amount and uniformity of deposition. See also dew and dew point.

**humidity** - a moderate degree of wetness,

especially of the atmosphere; dampness.

**hurricane** - a severe tropical cyclone in the North Atlantic Ocean, Caribbean Sea, Gulf of Mexico, or in the eastern North Pacific off the west coast of Mexico with winds of 75 miles per hour or greater accompanied by rain, lightning, and thunder that sometimes moves into temperate latitudes. Variant names given to the same type of storm in other areas of the world include typhoon (eastern Asia), cyclone (India), winy winy (Australia), and baguio (China Sea).

**hydrolysis** - process of an agent reacting with water. It does not materially affect the agent cloud in tactical use, because the rate of hydrolysis is too slow.

**hygrometer** - consists of two similar thermometers with the bulb of one being kept wet. This is so that the cooling that results from the evaporation makes the wet bulb register a lower temperature than the dry one. The difference between the readings constitutes a measure of the dryness (humidity) of the atmosphere.

**hygroscopic** - readily takes up and retains water, such as water in clay.

**infrared radiation** - thermal electromagnetic radiation lying outside the visible spectrum at the red end with wavelengths longer than those of visible light.

**inversion** - an increase of air temperature with increase in altitude (the ground being colder than the surrounding air). When an inversion exists, there are no convection currents and wind speeds are below 5 knots. The atmosphere is stable and normally is considered the most favorable state for ground release of chemical agents.

**ionosphere** - the part of the earth's atmosphere beginning at an altitude of about 50 kilometers (30 miles) and extending outward 500 kilometers (300 miles) or more.

**isobar** - a line drawn on a map or chart connecting places of equal or constant pressure. In meteorology, it most often refers to a line drawn through all points of equal atmospheric pressure along a given reference surface, such as a constant height surface (notably mean-sea-level on surface charts); the vertical plane of a synoptic cross section, or a map of the air unaffected by surface heating or cooling. The pattern of isobars has always been a main feature of surface chart analysis. Until recently

it was standard procedure to draw isobars at 3-millibar intervals. However, the advent of constant pressure charts for upper-air analysis has brought about the use of 4-millibar intervals to simplify the conversion from surface isobars to 1,000-millibar contour lines.

**isothermal** - of equal or constant temperature with respect to space, volume, or pressure.

**joules (abbreviated J)** - international system unit of energy, equal to the work done when the point of application of a force of 1 newton is displaced 1 meter in the direction of the force.

**katabatic wind** - any wind blowing down an incline; the opposite of anabatic wind. If the wind is warm, it is called a foehn; if cold, it may be a fall wind (such as the bora) or a gravity wind (such as a mountain wind).

**kg** - kilogram(s).

**kmph** - kilometer(s) per hour.

**lapse** - a marked decrease in air temperature with increasing altitude because the ground is warmer than the surrounding air. This condition usually occurs when skies are clear and between 1100 and 1600 hours, local time. Strong convection currents exist during lapse conditions. For chemical operations, the state is defined as unstable. This condition is normally considered the most unfavorable for the release of chemical agents.

**lapse rate** - the rate of change in atmospheric temperature with increase of height. The variable normally is temperature unless specified otherwise. This is a vertical direction of travel (up or down) and the temperature may rise or fall suddenly.

**leeward** - the side the wind is blowing away from. Used most often in this manual in reference to a slope facing away from the wind.

**M** - meter(s).

**mechanical turbulence** - irregular motion of air resulting from surface roughness and wind speed.

**met message** - gives wind direction in different increments. May be artillery, ballistic, fallout, computer, or NATO in origin.

**meteorology** - the science that deals with the study of the atmosphere (or weather) and its phenomena, especially with weather and weather forecasting.

**mg** - milligram.

**micrometeorology** - the portion of meteorology

dealing with the observation and explanation of small-scale weather and weather forecasting for a local area up to several kilometers in diameter.

**min** - minute(s).

**mistral** - a northwesterly or northerly wind which blows offshore along the north coast of the Mediterranean from Ebra to Genoa. It is characterized by its frequency, strength, and dry coldness.

**mixing height** - the height to which atmospheric pollutants can be distributed by convective mixing in unstable conditions.

**mph** - miles per hour.

**NBC** - nuclear, biological, and chemical.

**neutral** - when the temperature of the ground is approximately the same as the temperature of the lower air up to 4 meters above it. This condition has light to moderate winds and slight turbulence, and is considered average for the release of chemical agents.

**nimbostratus (abbreviated Ns)** - a low-level, principal cloud type, gray colored and often dark, rendered diffuse by more or less continuously falling rain, snow, or sleet of the ordinary varieties and not accompanied by lightning, thunder, or hail. In most cases the precipitation reaches the ground, but not necessarily. Nimbostratus is composed of suspended water droplets, sometimes supercooled, and of falling raindrops and/or snow and ice crystals or flakes. It occupies a layer of large horizontal and vertical extent. The great density and thickness (usually many thousands of feet) of this cloud prevent observation of the sun. This, plus the absence of small droplets in its lower portion, gives nimbostratus the appearance of dim and uniform lighting from within. It also follows that nimbostratus has no well-defined base, but rather a deep zone of visibility weakness. A false base may frequently appear at the level where snow melts into rain.

**pibal** - see pilot-balloon observation.

**pillaring** - rapid rising of smoke clouds due to heat generated by burning munitions and/or existing convection currents.

**pilot balloon** - a small unmanned balloon whose ascent is followed by a theodolite (instrument) to obtain data for the computation of the speed and direction of winds in the upper air.

**pilot-balloon observation (abbreviated**

- pibal**) - a method of winds aloft observation, that is, the determination of wind speeds and directions in the atmosphere above a station. This is done by reading the elevation and azimuth angles of a theodolite (instrument) while visually tracking a pilot balloon. The ascension rate of the balloon is approximately determined by careful inflation to a given total lift. After release from the ground, periodic readings (usually at one-minute intervals) of elevation and azimuth angles of the balloon are recorded. These data are transferred to a winds aloft plotting board, and wind speed and direction at selected levels are calculated by trigonometric methods.
- planetary boundary layer (also called the friction layer or atmospheric boundary layer)** - that layer of the atmosphere from the earth's surface to the geostrophic wind level.
- precipitation** - any or all of the forms of water particles, whether liquid or solid, that fall from the atmosphere and reach the ground. It is a major class of hydrometeor, but it is distinguished from cloud, fog, dew, rime, and frost in that it must fall. It is distinguished from cloud and virga in that it must reach the ground.
- pressure gradient (also, in meteorology, called barometric gradient)** - the rate of decrease (gradient) of pressure in space at a fixed time. The term is sometimes used to denote simply the magnitude of the gradient of the pressure field.
- psychrometer** - a hygrometer (which consists of two similar bulb thermometers with one bulb kept wet and the other one dry). The psychrometer has a sling attached to the mounted bulb thermometers. A handle is on the free end of the sling. The operator can whirl the bulb thermometers in a circular pattern and speed up the evaporation of water from the wet bulb thermometer. The difference between the two readings constitutes the measure of the dryness of the air—or humidity of the atmosphere—at your location.
- QSTAG** - quadripartite standardization agreement.
- radiation inversion** - a stable condition caused by heat released from the earth. See also inversion.
- radiosonde** - a miniature radio carried aloft by an unmanned balloon to broadcast the pressure, temperature, and relative humidity of the upper air and to automatically transmit that information to the ground.
- raob** - an abbreviation for radiosonde observation.
- rate of dosage** - see dose rate.
- rawin** - a winds aloft observation made by balloon and radio methods (rawinsonde observation).
- relative humidity (popularly called humidity)** - the ratio of the actual amount of water vapor present in the air to the saturation point at the same temperature. The corresponding ratios of specific humidity or of mixing ratio give approximations of sufficient accuracy for many purposes in meteorology. The relative humidity is usually expressed in percent and can be computed from psychrometric (wet bulb-dry bulb temperature) data.
- rime** - a rough, white icy covering deposited on trees, or other exposed objects, somewhat resembling white frost, but formed only from fog- or vapor-bearing air.
- RP** - red phosphorus.
- screening length** - distance from the source of a smoke screen to the point downwind where the background begins to become recognizable.
- sferics** - a phonetic contraction of the word "atmospherics."
- SGF2** - standard grade fuel number 2.
- smoke** - a particulate of solid or liquid particles dispersed into the air on the battlefield to degrade enemy ground and aerial observation. Smoke has many uses—screening smoke, signaling smoke, smoke curtain, smoke haze, and smoke deception. Thus it is an artificial aerosol.
- solstice** - one of the two points on the sun's apparent annual path where it is displaced farthest north or south from the earth's equator. In the northern hemisphere, the summer solstice is reached about 22 June. In the southern hemisphere, the winter solstice is reached about 22 December.
- STANAG** - standardization agreement.
- storm** - any disturbed state of the atmosphere, especially as affecting the earth's surface, and strongly implying destructive or unpleasant weather.
- stratocumulus (abbreviated Sc)** - a principal



low-level cloud type, predominantly stratiform, in the form of a gray and/or whitish layer or patch, which nearly always has dark parts and is nonfibrous.

**stratosphere** - the region of the upper atmosphere characterized by little or no temperature change with altitude. The stratosphere extends from the tropopause (13 kilometers) to approximately 80 kilometers.

**stratus (abbreviated St)** - a principal low-level cloud type in the form of a gray layer with a rather uniform base. Stratus does not usually produce precipitation, but when it does occur, it is in the form of minute particles, such as drizzle, ice crystals, or snow grains. Stratus often occurs in the form of ragged patches or cloud fragments in which case rapid transformation is a common characteristic. When the sun is seen through the cloud, its outline is clearly discernible, and it may be accompanied by corona phenomena. In the immediate area of the solar disk, stratus may appear very white. Away from the sun, and at times when the cloud is sufficiently thick to obscure it, stratus gives off a weak, uniform luminance.

**sublimation** - the transition of a substance from the solid phase directly to the vapor state, or vice versa, without passing through the intermediate liquid phase.

**superadiabatic lapse rate** - an environmental lapse rate greater than the adiabatic lapse rate such that potential temperature decreases with height.

**surface boundary layer** - the portion of the atmosphere lying next to the surface of the earth and extending up to between 50 and 100 meters.

**SWO** - staff weather officer.

**synoptic** - in general, pertaining to or affording an overall view. In meteorology, this term has become somewhat specialized in referring to the use of meteorological data obtained simultaneously over a wide area for presenting a comprehensive and nearly instantaneous picture of the state of the atmosphere. Thus, to a meteorologist, synoptic takes the additional connotation of simultaneity.

**thermal turbulence** - irregular motion of air caused by convection currents rising from heated surfaces. See also mechanical turbulence.

**tornado (sometimes called cyclone or twister)** - a violently rotating column of air, pendant from a cumulonimbus cloud, and nearly always observable as a funnel cloud or tuba. On a local scale, it is the most destructive of all atmospheric phenomena. Its vortex, commonly several hundred yards in diameter, whirls usually counterclockwise with wind speeds of 100 to more than 300 miles per hour (161 to 483 kmph). Its general direction of travel is governed by the motion of its parent cloud.

**TOT** - time on target.

**toxicity** - relating to a poison or toxin; poisonous.

**toxin** - a colloidal poisonous substance that is a specific product of the metabolic activities of a living organism and is notably toxic when introduced into living tissue.

**tropopause** - the zone of transition between the troposphere and the stratosphere (approximately 13 kilometers). The tropopause normally occurs at an altitude of between 25,000 and 45,000 feet in polar and temperate zones. It occurs at 55,000 feet in the tropics.

**troposphere** - the lower levels of the atmosphere extending from the earth's surface up to the tropopause. It is characterized by convective air movements and a large vertical temperature change.

**turbulence** - irregular motion of air. See also mechanical turbulence and thermal turbulence.

**unstable condition** - see lapse.

**venturi effect** - constricting a passageway, so that the air (or fluid) moving through the constriction is greatly accelerated.

**virga** - rain or snow that is dissipated in falling and does not reach the ground, commonly appearing in trails descending from a cloud layer.

**virulent agents** - agents that produce rapid, severe, and malignant results in victims.

**volatile** - pertaining to a readily vaporizable liquid that evaporates at a relatively low ambient temperature.

**weather** - the state of the atmosphere, mainly with respect to its effects upon life and human activities. As distinguished from climate, weather consists of the short-term (minutes to months) variations of the atmosphere. Popularly, weather is thought of in terms of temperature, humidity, precipitation, cloudiness, brightness, visibility, and wind.

**weather forecast** - a prediction of weather conditions expected at a place, within an area, or along a route for a specified time or during a specified period.

**weather summary** - a description of weather along a route or within an area during a specific period; used in analyzing the effects of weather on recent operations and estimating effects on future operations.

**wind** - air in motion, usually parallel to the earth's surface.

**wind direction** - the compass point, degree, or roils (see Figure C-4) from which the wind blows.

**wind shear** - a change of wind speed, direction, and magnitude.

**wind velocity** - the horizontal direction and speed of air motion.

**windward** - the side receiving the wind's force. Used most often in this manual in reference to a slope facing into the wind.

**woods** - for chemical behavior purposes, trees in full leaf (coniferous or medium-dense deciduous forests). See, also, heavily wooded, coniferous, and deciduous.

**WP** - white phosphorus.